# Md Nahidul Islam

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personal website | Google Scholar | ORCID | Research Gate | GitHub | LinkedIn

## Education

**Doctor of Philosophy (Ph.D.) in Computer Science** *2024 – Present*
UNIVERSITY OF MEMPHIS Memphis, TN, USA
Advisor: Dr. Myounggyu Won | GPA: 3.95/4.00 | M.S. earned en route, May 2026
*M.S. Thesis:* BucketKD: A Safety-Aware Bucket-Based Knowledge Distillation Framework for End-to-End Motion Planning

**Bachelor of Science (B.Sc.) in Computer Science and Engineering** *2012 – 2017*
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET) Dhaka, Bangladesh

## Work Experience

**Graduate Assistant** *Jan. 2024 – Present*
UNIVERSITY OF MEMPHIS Memphis, TN, USA

- Develop trustworthy evaluation and decision-making methods for autonomous driving, focusing on calibration, abstention, interaction modeling, and safety validation.
- Build large-scale research pipelines using PyTorch, CARLA, WOMD, Argoverse 2, and GPU/HPC infrastructure.
- Support *Capstone Software Project* and *Operating Systems*; evaluate projects and mentor classes of 50–80 students.

**Technical Mentor and Volunteer** *2024 – Present*
AUTONOMOUS R/C CARS CYBERSECURITY SUMMER CAMP Memphis, TN, USA

- Teach introductory Python, autonomous driving, and automotive cybersecurity through supervised Donkey Car activities for K–12 students.

**Assistant Director, Enterprise Data Warehouse** *Nov. 2020 – Dec. 2023*
BANGLADESH BANK (CENTRAL BANK OF BANGLADESH) Dhaka, Bangladesh

- Designed ETL pipelines, analytics platforms, and internal web applications for enterprise-scale regulatory financial data using Oracle, Django, React, Docker, and CI/CD workflows.

**Software Engineer, AI Solutions Team** *Feb. 2020 – Oct. 2020*
BINATE SOLUTIONS LTD. Dhaka, Bangladesh

- Developed REST APIs, machine-learning services, and SaaS applications using Django, TensorFlow, and cloud deployment tools.

**Research Assistant** *Aug. 2018 – Jan. 2020*
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY (BUET) Dhaka, Bangladesh

- Conducted research in Bangla speech recognition and low-resource language processing, contributing to publications at ICASSP, LREC, and NAACL.

**Information Analyst, MIS Department** *Feb. 2017 – Mar. 2018*
ACI LTD. Dhaka, Bangladesh

- Built reporting dashboards and applied machine-learning methods to business and operations data.

## Selected Projects

**TRaCE: Transferable Route Search and Travel-Time Estimation** *2026 – Present*
PH.D. RESEARCH | GRAPH LEARNING, A*, ROUTE SEARCH, TRAVEL-TIME PREDICTION

- Built a source-trained, query-conditioned routing pipeline combining learned edge costs, A* guidance, alternative-route search, and route-conditioned travel-time estimation for unseen road networks.
- On held-out Porto, San Francisco, and Rome data, reduced search expansions by 64.8–73.8% and achieved 2.03–2.52× faster alternative-route generation; studied split-conformal uncertainty calibration.

**RIVET: Cross-City Travel-Time Estimation on Evolving Road Networks** *2026 – Present*
PH.D. RESEARCH | OPENSTREETMAP, GRAPH ROUTING, LARGE-SCALE EVALUATION

- Designed a leakage-audited, pre-registered zero-shot evaluation of source-trained travel-time estimators across Porto, San Francisco, and Rome, including a sealed 100,000-trip replication cohort.
- Reconstructed historical road graphs to quantify map-dependent service reliability: 3.7–5.1% of queries routable on current maps were not routable historically, and 83–88% of comparable routes changed geometry by over 100 m in the two primary cities.

**Residual-Signal Protocol (RSP): Evaluation of Interaction Representations** *2026 – Present*
PH.D. RESEARCH | PYTORCH, ARGOVERSE 2, WOMD, MTR, QCNET

- Developed a protocol for testing whether interaction representations explain forecasting errors beyond physical and scene factors, using controls and cross-model, cross-dataset validation.
- Extended the evaluation to counterfactual neighbor responses, predictive-distribution shifts, and downstream safety outcomes; submitted to ICRA 2027.

**DyadCode: Learning Pairwise Driving-Interaction Representations** *2026 – Present*

PH.D. RESEARCH | PYTORCH, REPRESENTATION LEARNING, TRAJECTORY FORECASTING

- Developed **dyadcode-mlp**, the original MLP-based discrete target–neighbor interaction representation, and compared its learned codes with random and clustering baselines.
- Designing **DyadCode 2.0**, a path-aware, selectively gated representation for context-dependent driving interactions and downstream prediction tasks.

**CRiC: Counterfactual Risk Certification for Interactive Driving** *2026 – Present*

PH.D. RESEARCH | PYTORCH, UNCERTAINTY QUANTIFICATION, CONFORMAL CALIBRATION

- Designed a protocol-scoped framework for certifying counterfactual risk of candidate driving decisions using calibrated risk bounds, abstention, and reliability evaluation.

**BucketKD: Safety-Aware Motion Planner Compression** *Jan. 2024 – Feb. 2026*

M.S. THESIS | PYTORCH, CARLA, KNOWLEDGE DISTILLATION

- Developed bucket-based knowledge distillation for end-to-end autonomous-driving planning, with TTC-guided waypoint attention and adaptive safety-aware bucket construction.

**LiDARBridge: Simulation-to-Real LiDAR 3D Object Detection** *2026*

RESEARCH COLLABORATION | LIDAR, 3D DETECTION, CARLA, NUSCENES

- Contributed to a sim-to-real 3D object detection framework combining range-dependent LiDAR noise modeling with prototype alignment between synthetic and real point-cloud representations.
- Studied transfer to real-world detection, including limited-label settings; paper accepted at IEEE CCNC 2027.

**Stealthy Anomaly Detection with Autoencoders** *2024 – 2025*

RESEARCH COLLABORATION | AUTOENCODERS, TIME-SERIES ANOMALY DETECTION

- An anomaly-detection method using autoencoders and windowed variance-aware loss functions; published at IEEE MILCOM 2025.

## Technical Skills

**Programming / Web** Python, C++, C, C#, Java, JavaScript, SQL/PL-SQL, R; Django, FastAPI, React, Redux, Node.js, ASP.NET

**AI / Robotics** PyTorch, TensorFlow, Hugging Face, OpenCV; CARLA, Donkey Car, Arduino Uno, Raspberry Pi, trajectory forecasting, motion planning, TTC safety metrics, WOMD, AV2

**Systems / Data** Linux, Git, Docker, HPC/GPU clusters, AWS, DigitalOcean, CI/CD; Oracle, PostgreSQL, MySQL, MS SQL Server

## Publications and Manuscripts

Full list available at: Google Scholar | ORCID | Research Gate

*Author of this CV in **bold**. Submitted manuscripts are clearly marked as under review.*

[1] **M. N. Islam**, M. Won, "TRaCE: Transferable Route Search and Travel-Time Estimation on Unseen Road Networks," *submitted to The ACM Web Conference (WWW), 2027.*

[2] **M. N. Islam**, M. Won, "RIVET: Revisiting Cross-City Travel-Time Estimation as Road Networks Evolve," *submitted to The ACM Web Conference (WWW), 2027.*

[3] **M. N. Islam**, M. Won, "What Aggregate Metrics Miss: A Residual-Signal Protocol for Interaction Representations in Trajectory Forecasting," *submitted to the IEEE International Conference on Robotics and Automation (ICRA), 2027.*

[4] **M. N. Islam**, M. Won, "CRiC: Protocol Scoped Counterfactual Risk Certification for Interactive Driving," *submitted to CVPR 2027.*

[5] **M. N. Islam**, M. H. Ali, D. Dasgupta, and M. Won, "BucketKD: A Safety-Aware Bucket-Based Knowledge Distillation Framework for End-to-End Motion Planning," *submitted to IEEE IV 2027.*

[6] L. Won, **M. N. Islam**, M. H. Ali, D. Dasgupta, and M. Won, "ATLAS: Adaptive Temporal Weighting and Location Optimization for Multi-Frame Attacks in Autonomous Driving," *submitted to IEEE IV 2027.*

[7] L. Won, N. H. Nguyen, **M. N. Islam**, L. Das, and M. Won, "LiDARBridge: Range-Dependent LiDAR Noise Modeling and Prototype Alignment for Simulation-to-Real 3D Object Detection," in *Proc. IEEE 24th Consumer Communications & Networking Conference (CCNC), 2027.*

[8] **M. N. Islam**, "BucketKD: A Safety-Aware Bucket-Based Knowledge Distillation Framework for End-to-End Motion Planning," M.S. thesis, Dept. of Computer Science, University of Memphis, Memphis, TN, USA, 2026. [link]

[9] L. Hwang, **M. N. Islam**, M. H. Ali, D. Dasgupta, and M. Won, "Detecting Stealthy Anomalies with Autoencoders Using Windowed Variance-Aware Loss Functions," in *Proc. IEEE Military Communications Conference (MILCOM)*, 2025. [DOI]

[10] N. Sadeq, S. Ahmed, S. S. Shubha, **M. N. Islam**, and M. A. Adnan, "Bangla Voice Command Recognition in End-to-End System Using Topic Modeling Based Contextual Rescoring," in *Proc. IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP)*, 2020.

[11] S. Ahmed, N. Sadeq, S. S. Shubha, **M. N. Islam**, and M. A. Adnan, "Preparation of Bangla Speech Corpus from Publicly Available Audio & Text," in *Proc. 12th Int. Conf. Language Resources and Evaluation (LREC)*, 2020, pp. 6586–6592.

[12] S. S. Shubha, N. Sadeq, S. Ahmed, **M. N. Islam**, M. A. Adnan, M. Y. A. Khan, and M. Z. Islam, "Customizing Grapheme-to-Phoneme System for Non-Trivial Transcription Problems in Bangla Language," in *Proc. NAACL-HLT*, 2019, pp. 3192–3201.